

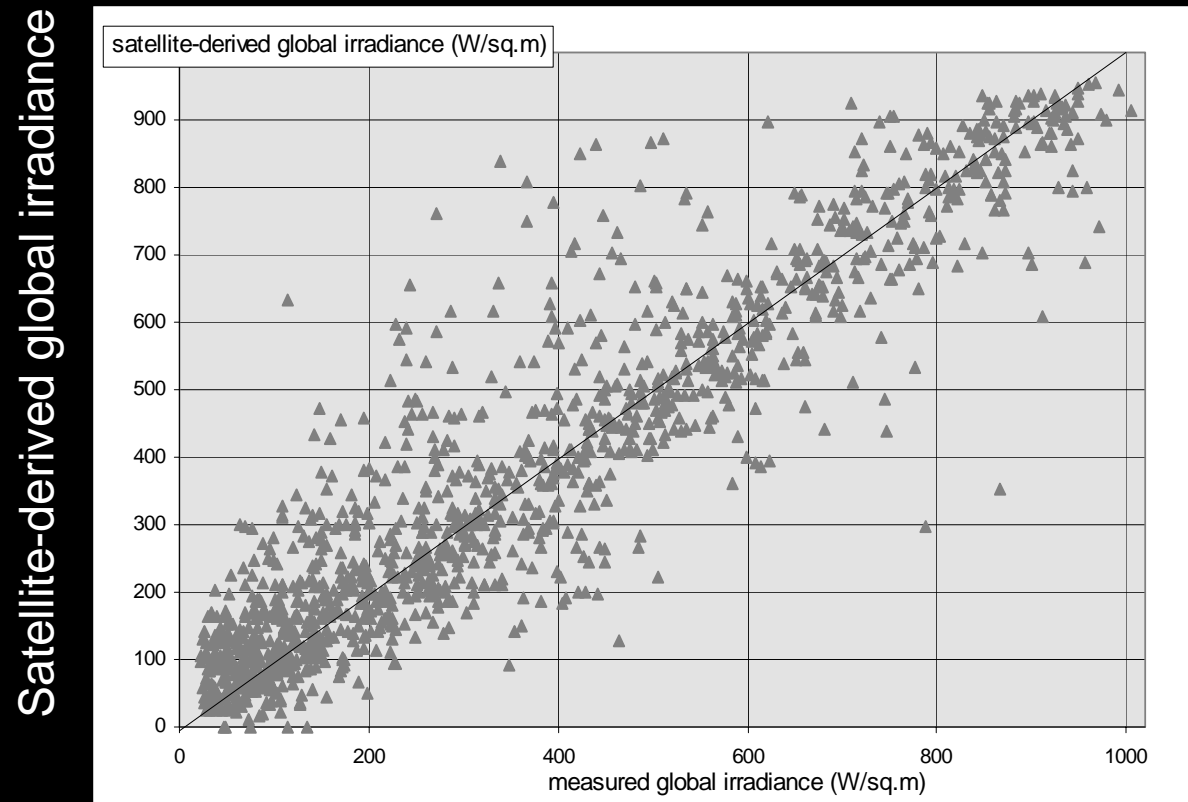
**EFFECTIVE ACCURACY OF SATELLITE-DERIVED
GLOBAL, DIRECT AND DIFFUSE IRRADIANCE
IN THE CENTRAL US**

**Richard Perez & Marek Kmiecik
ASRC**

**Antoine Zelenka
MeteoSuisse**

**Ray George & David Renné
NREL**

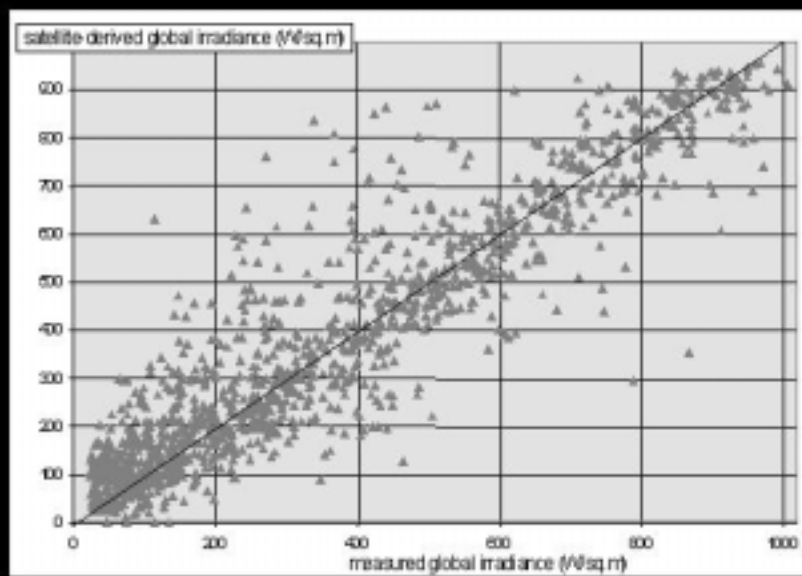
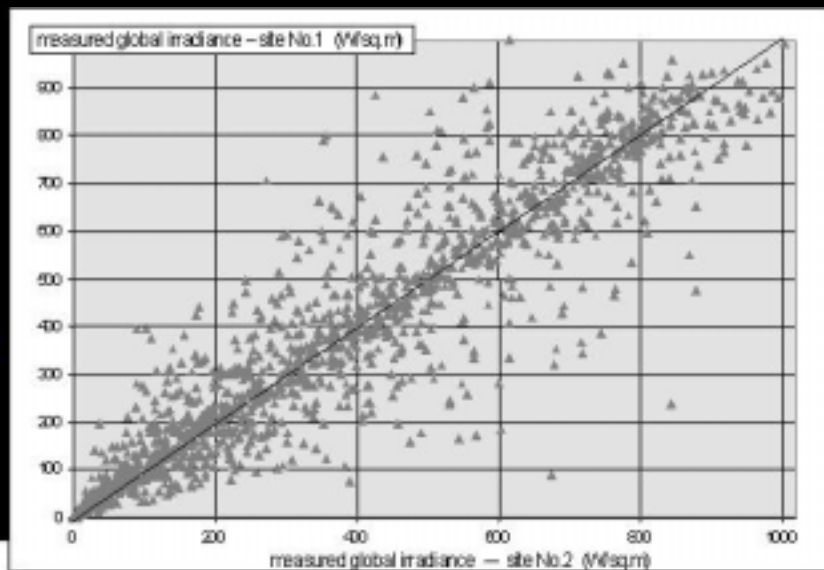
Short term Effective Accuracy



Measured global irradiance

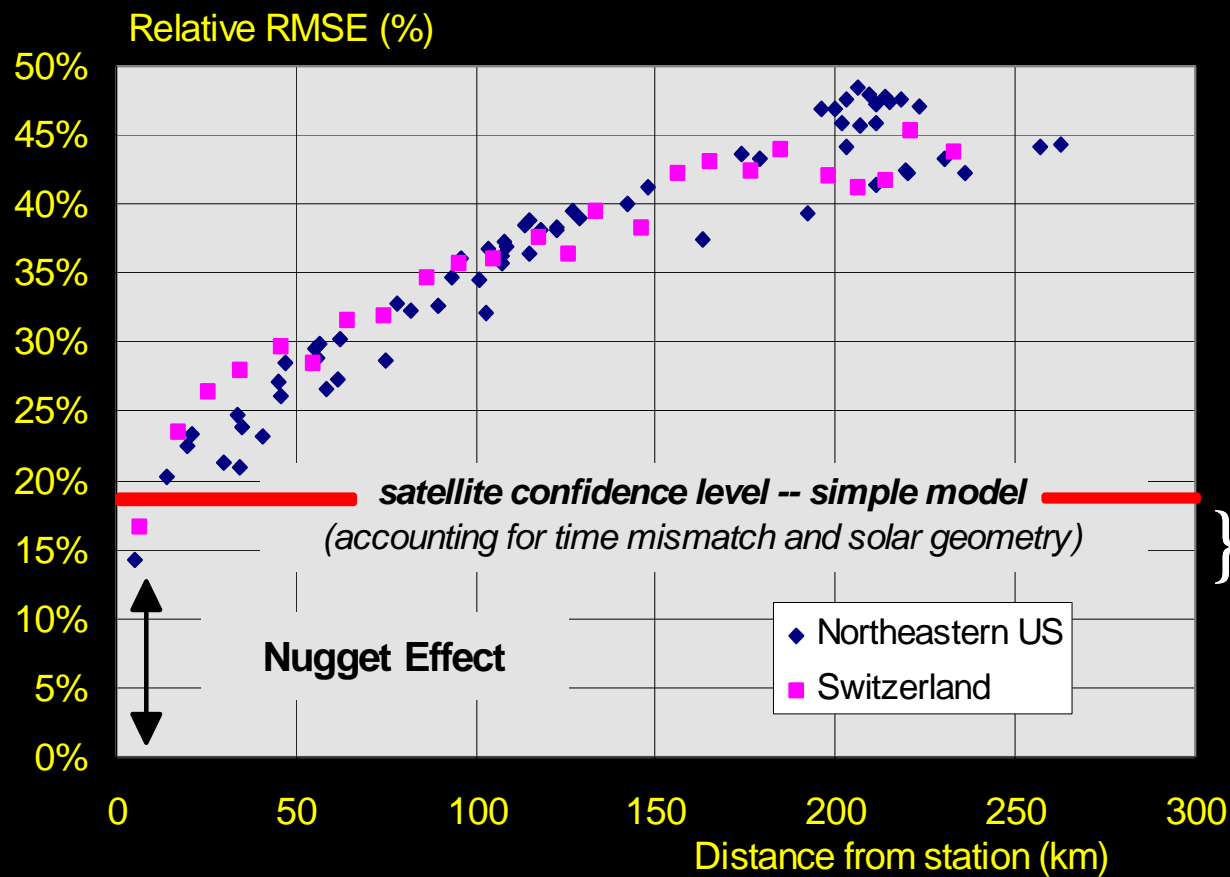
time/site specific data

Perez et al., ASRC



Hourly RMS Error as a function of station distance

satellite becomes more accurate beyond 20 km

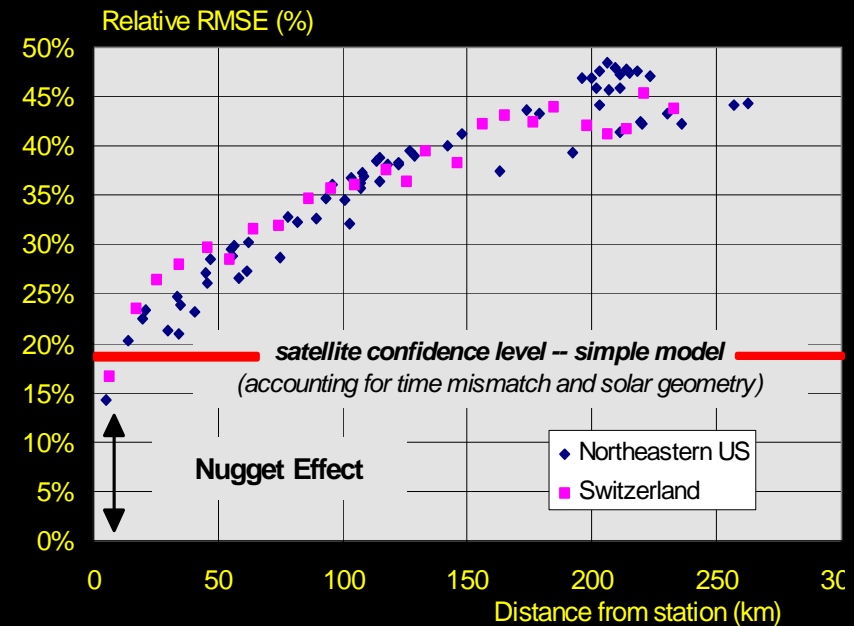


} *Satellite's Effective Accuracy*

Perez et al. ASRC

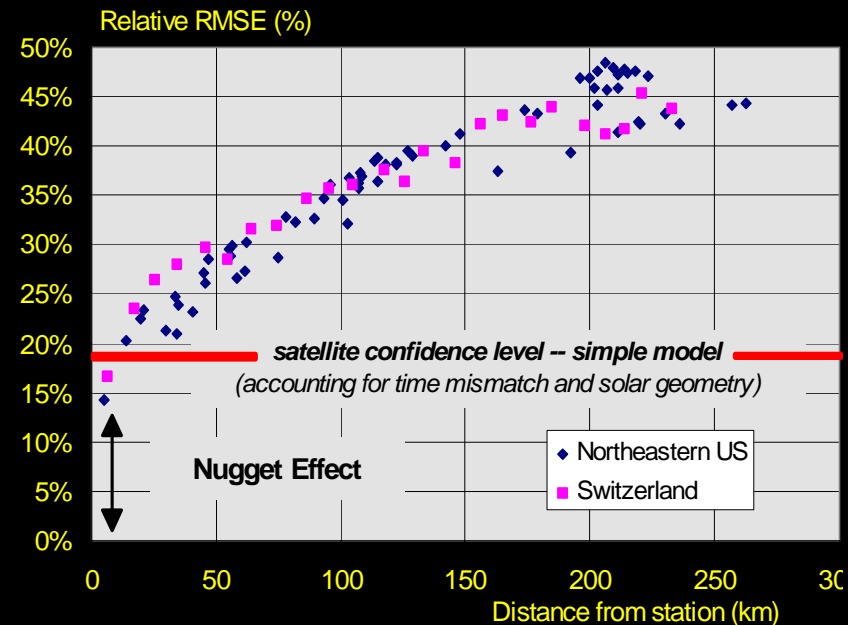
NE-US / Switzerland Study

- Ground measurement networks not designed for research
- Hourly data only
- Global irradiance only
- Humid / temperate climates
- Marked orographic features



NE-US / Switzerland Study

- Ground measurement networks not designed for research
- Hourly data only
- Global irradiance only
- Humid / temperate climates
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SOUTHERN GREAT PLAINS STUDY

- Ground measurement network designed for research (ARM)
- One minute, hourly and daily data
- Global, direct and diffuse irradiances
- Continental climate
- Limited orographic features

ARM



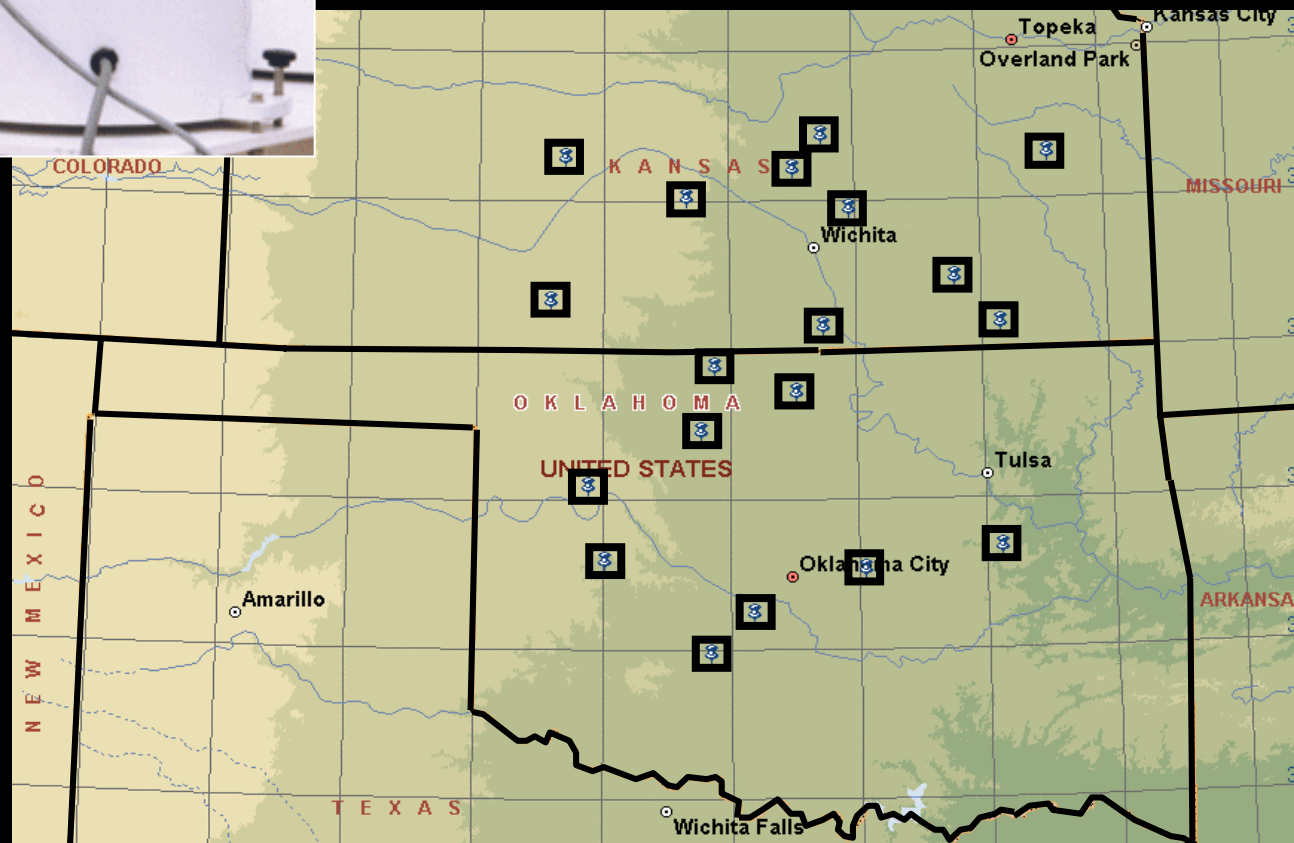
<http://www.arm.gov/>



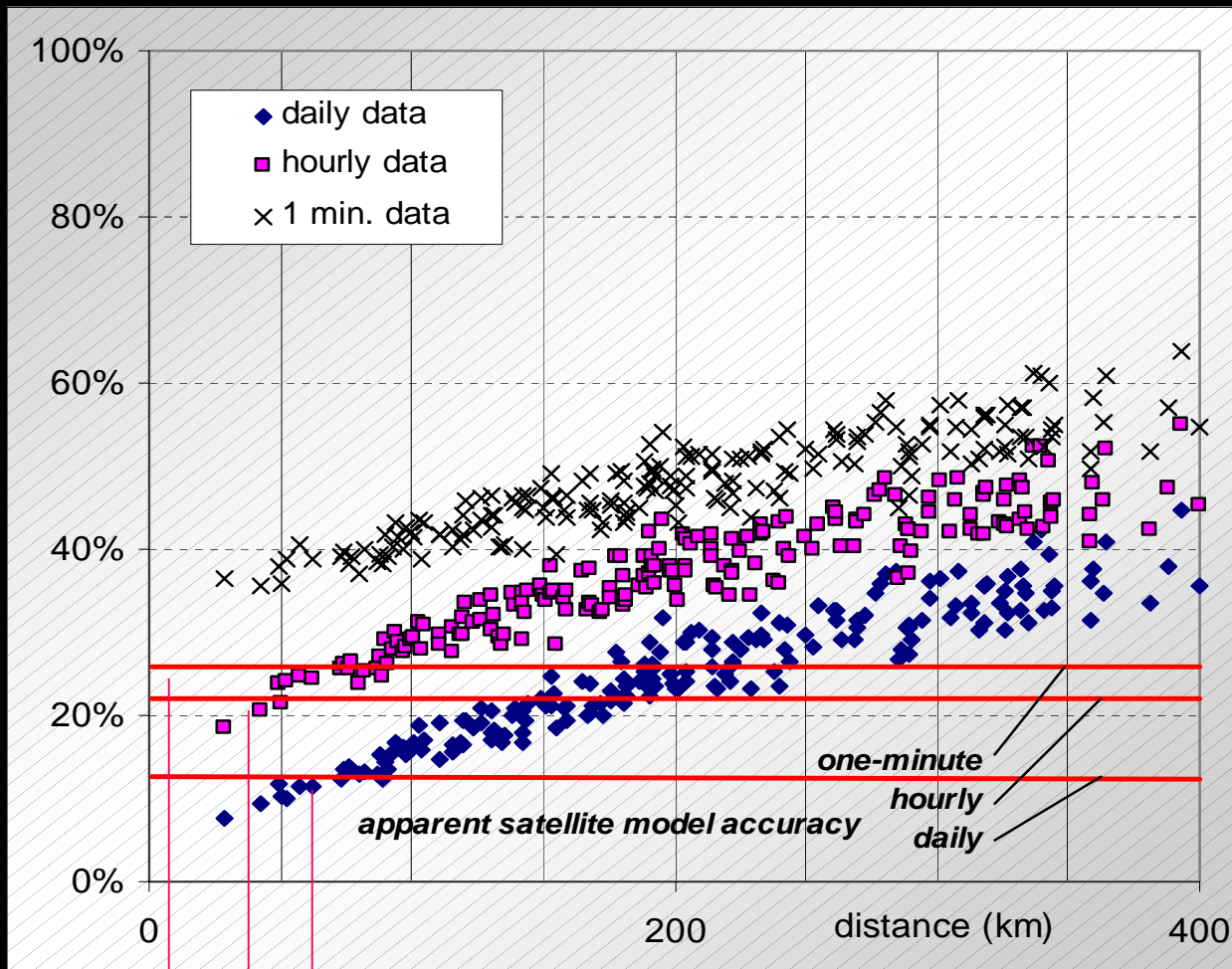


ARM Extended Facility

- WMO class I global, direct, diffuse
- 19 out of 26 stations used for analysis

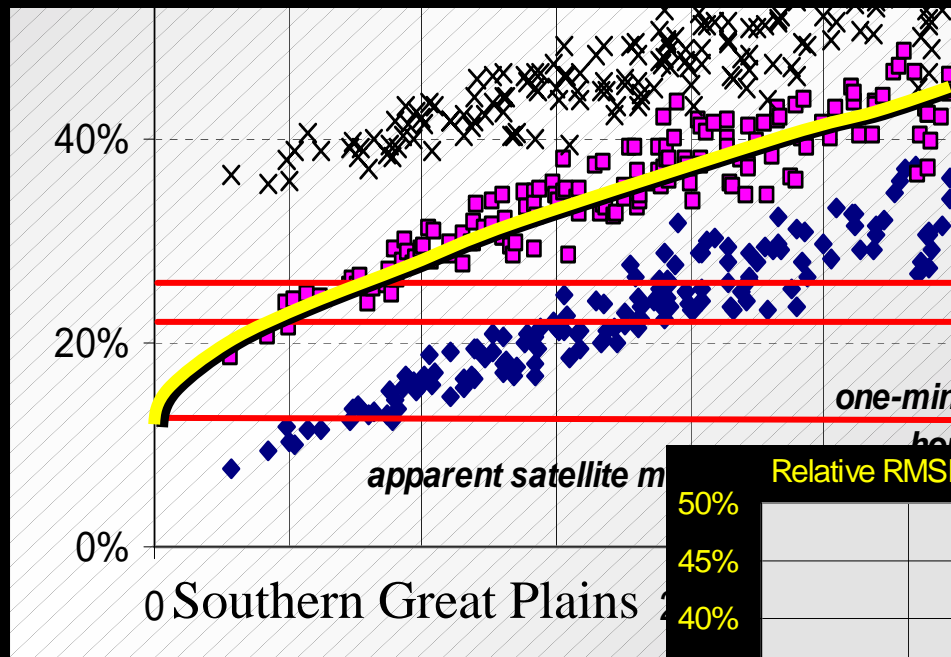


GLOBAL

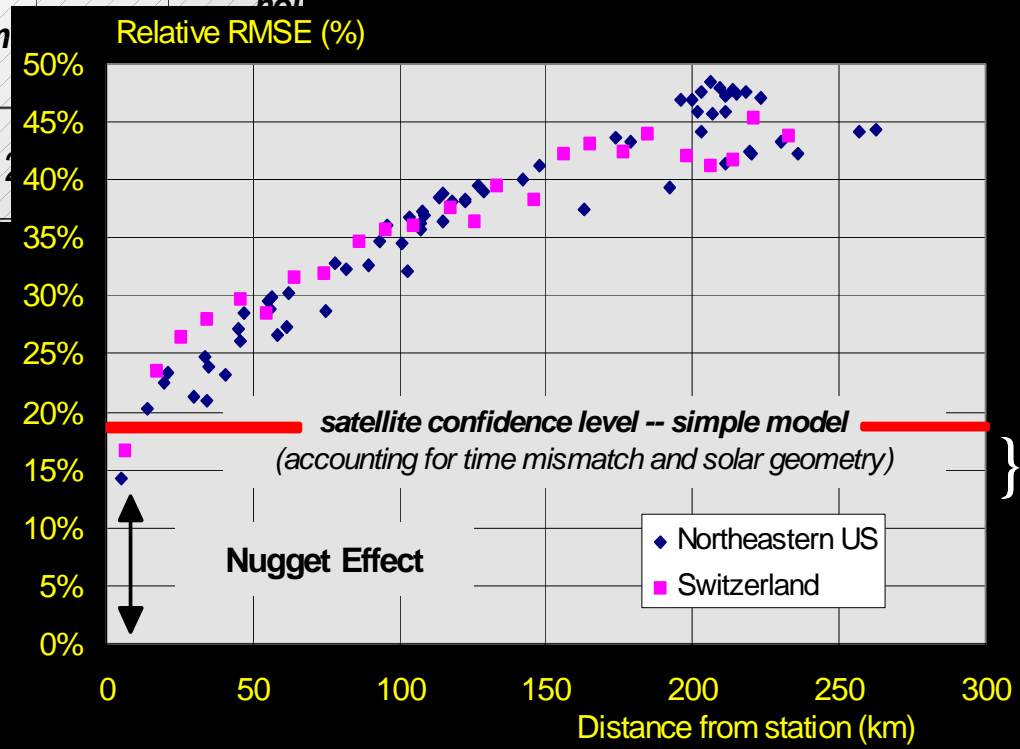


Daily breakeven distance ~ 60 km
Hourly breakeven distance ~ 35 km
1-minute breakeven distance ~ < 5 km

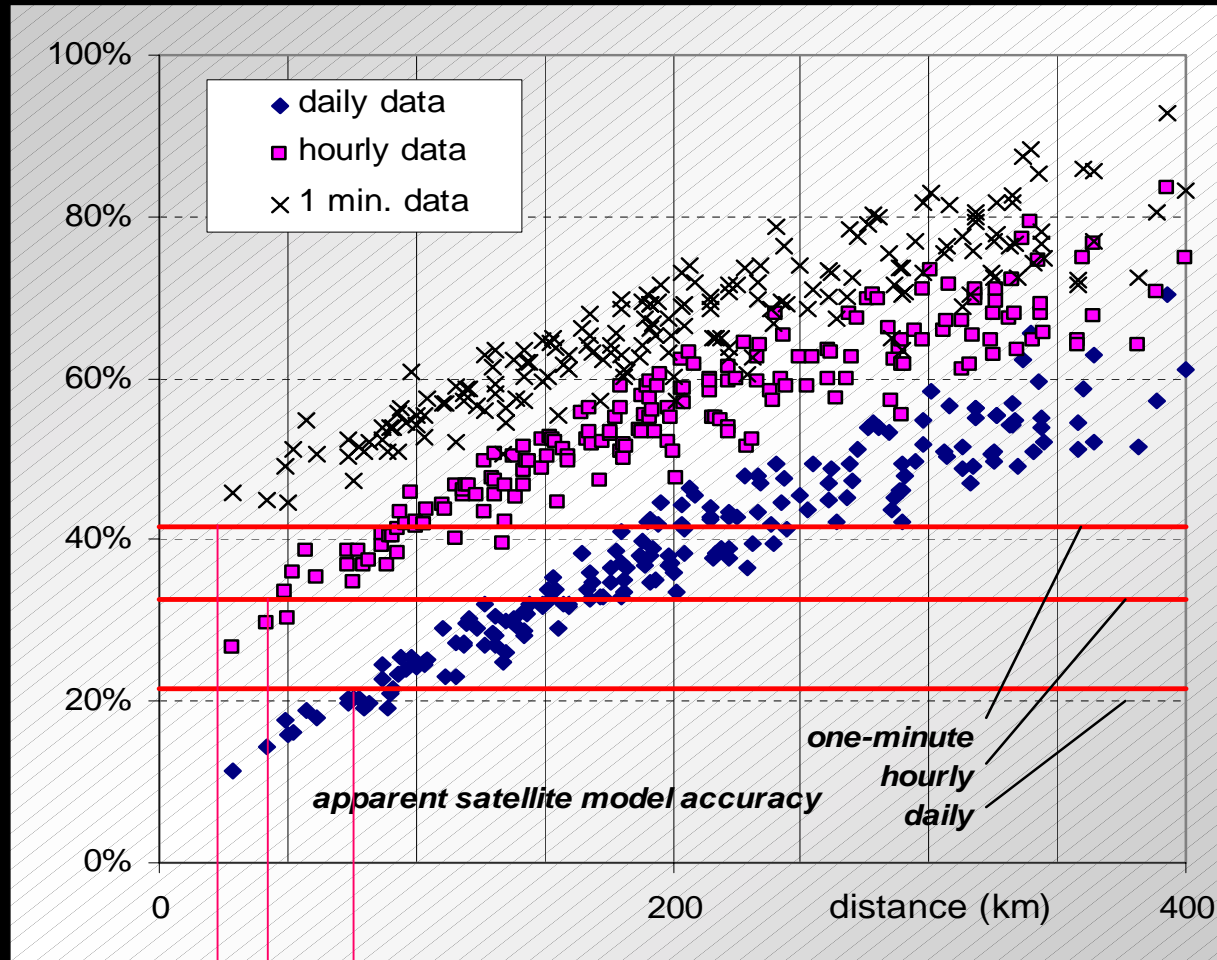
GLOBAL



} — Effective accuracy



DIRECT

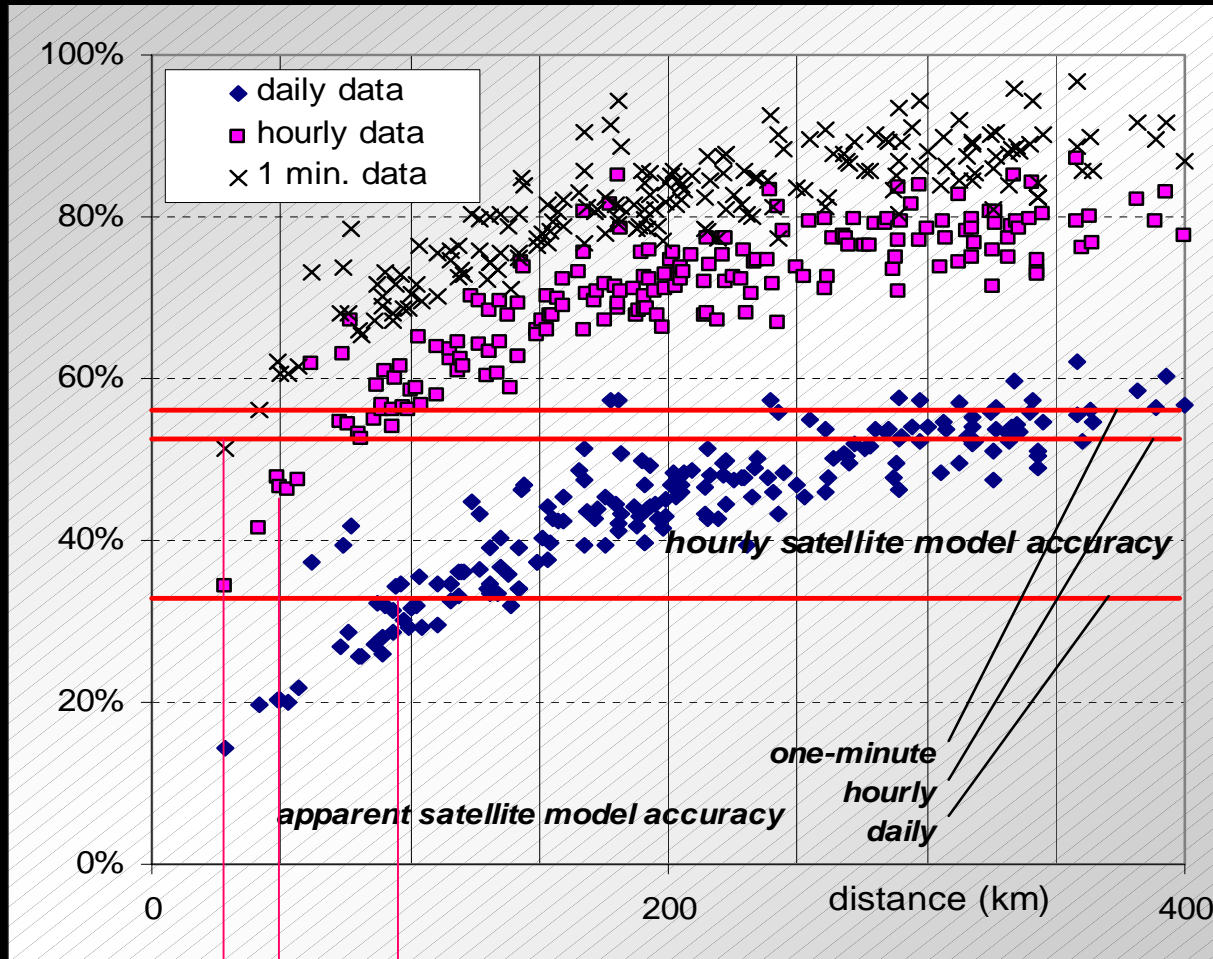


Daily break-even distance ~ 75 km

Hourly break-even distance ~ 45 km

1-minute break-even distance ~ 20 km

DIFFUSE



Daily breakeven distance ~ 100 km

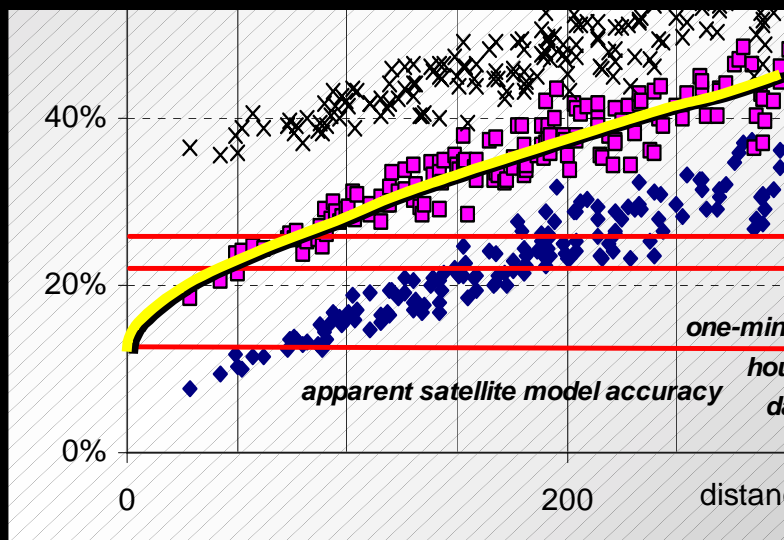
Hourly breakeven distance ~ 50 km

1-minute breakeven distance ~ 25 km

CONCLUDING REMARKS

Confirmation / extension of initial investigations

Hourly	Global effective accuracy	~ 15%
	Direct effective accuracy	~ 25%
	Diffuse effective accuracy	~ 35%



} — Effective accuracy

CONCLUDING REMARKS

Confirmation / extension of initial investigations

Hourly	Global effective accuracy	~ 15%
	Direct effective accuracy	~ 25%
	Diffuse effective accuracy	~ 35%

Need to expand study to arid and
tropical/subtropical climates